PATENT ABSTRACTS OF JAPAN

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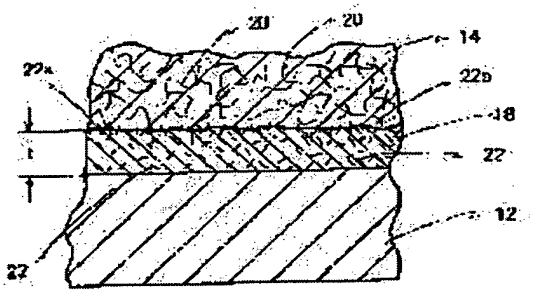
(54) FRICTION MATERIAL

(57)Abstract:

PURPOSE: To obtain a friction material capable of improving the bonding strength of a lining layer even by using a flat plate by joining a non-asbestos- based short fiber-containing lining layer to the plate made of a metal through a specific adhesive layer.

CONSTITUTION: A friction material is obtained by joining a lining layer 14 which is a friction element containing non-asbestos-based short fiber 20 such as aramid short fiber blended therein to a plate 12 made of a metal through an adhesive layer 18 containing heat-resistant short fiber 22 such as aramid short fiber blended therein. The aramid short fiber as the heat-resistant short fiber 22 preferably has 5-20μm diameter and 0.5-1mm length and is blended in an amount of preferably 0.5-2vol%. Furthermore, e.g. an acrylonitrile- butadiene rubber adhesive or an epoxy-based adhesive is used as the adhesive.



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Detailed Description of the Invention]
[0001]
[Industrial Application] this invention relates to the friction material used for brakes and clutches, such as vehicles, still in detail about friction material.
[0002]
[Description of the Prior Art] The friction material to which the lining layer which is the friction element with which inorganic packing, such as metal powders, such as iron and copper, an inorganic staple fiber, a graphite, an antimony oxide, and a barium sulfate, etc. was blended as friction material used for brakes, such as vehicles, and the metal plate were joined through the glue line is used. As this inorganic staple fiber, although the asbestos staple fiber has mainly been used conventionally, the non asbestos system staple fiber which replaced with the asbestos staple fiber from viewpoints, such as prevention of pollution, in recent years, and was excellent in the thermal resistance of an aramid staple fiber etc. is being used.
[0003] However, that the bond strength of a lining layer and a metal plate is inferior as compared with the bond strength of the lining layer in asbestos system friction material made clear the non asbestos system friction material which the lining layer with which the non asbestos system staple fiber was blended, and the metal plate pasted up through the glue line. If the intensity of non asbestos system fiber is lower than the intensity of asbestos system fiber and makes the loadings of a non asbestos system staple fiber of the same grade as an asbestos system staple fiber, in order for coefficient of friction of the friction material obtained to fall, it is based on that the loadings of a non asbestos system staple fiber must be made more nearly little than an asbestos system staple fiber. For this reason, that the bond strength of a lining layer and a metal plate should be improved, this invention person etc. tried to form a rib-like salient in an adhesion side with the lining layer of a metal plate as proposed in JP,56-120440,U.
[0004]
[Problem(s) to be Solved by the Invention] Thus, since the adhesion area of a metal plate and a lining layer is expandable by forming a rib-like salient in an adhesion side with the lining layer of a metal plate, a bond strength can be improved as compared with the case where a lining layer is pasted up on a flat metal plate. However, forming a rib-like salient in a plane of composition with the lining layer of a metal plate complicates the processing process of a metal plate, and the cost of the friction material obtained becomes high. And since the plane of composition of a metal plate turns into a concavo-convex field, the glue line formed in the plane of composition of a metal plate also tends to become uneven, and also has the fault as for which spots become easy to be made to the bond strength of a lining layer. Then, even if the purpose of this invention is the lining layer joined to the flat metal plate through the glue line, it is to offer the non asbestos system friction material which may improve the bond strength of a lining layer.
[0005]
[Means for Solving the Problem] As a result of repeating examination that the aforementioned purpose should be attained, by applying the adhesives which mixed the aramid staple fiber beforehand on a flat metal plate, and subsequently pasting up a lining layer, this invention person etc. found out that the bond strength of a lining layer could be improved, and reached this invention. That is, this invention is in the friction material characterized by blending heat-resistant staple fibers, such as an aramid staple fiber, into this adhesives layer in the non asbestos system friction material to which the lining layer which is the friction element with which non asbestos system staple fibers, such as an aramid staple fiber, were blended, and the metal plate were joined through the glue line.
[0006]
[Function] When microscope observation of the cross section of the conventional non asbestos system friction material is carried out, there are very few numbers of the staple fiber which constructs a bridge in between a lining layer and glue lines. For this reason, if a lining layer is exfoliated from a metal plate, between a lining layer and glue lines will exfoliate. If microscope observation of the cross section of this point and the friction material of this invention is carried out, the bridge would be constructed over the a large number book of the heat-resistant staple fiber blended with the glue line between the lining layer and the glue line, and it will have connected both layers. For this reason, as compared with the conventional non asbestos system friction material, the bond strength of the friction material of this invention can be improved.
[0007]
[Example] this example is explained still in detail using a drawing. Drawing 1 a is the plan showing one example of this example, and the friction material 10 consists of the metal plate 12 with which breakthroughs 16 and 16 were punched, and the lining layer 14. This lining layer 14 is pasted up through the metal plate 12 and the glue line 18, as shown in drawing 1 b. Moreover, as for the lining layer 14, thermosetting resin, such as inorganic compounds, such as metal powders, such as iron and copper, an aramid staple fiber, a graphite, an antimony oxide, and a barium sulfate, and phenol resin, etc. is blended.
[0008] The enlarged view (microphotography) to which the round mark portion P of drawing 1 b was expanded is shown in drawing 2 . As shown in drawing 2 , thickness t is 0.05-0.15mm, and the lining layer 14, the metal plate 12, and the glue line 18 to paste up are formed of the thermosetting adhesive which is mainly heat-resistant

adhesives. A glue line 18 is because thermal resistance is needed in order to pass a baking process in the manufacturing process of friction material so that it may mention later. As this thermosetting adhesive, elastomeric adhesives, such as acrylonitrile-butadiene rubber (NBR), a phenol system, or epoxy system resin adhesives can be mentioned.

[0009] In this example, the aramid staple fiber 20 or the aramid staple fiber 22 is blended with the lining layer 14 and the glue line 18. In this aramid staple fiber, the fiber length of the aramid staple fiber 22 blended into the glue line 18 is shorter than the fiber length of the aramid staple fiber 20 blended with the lining layer 14. The bridge was constructed over aramid staple-fiber 22a which exists near the interface with the lining layer 14 among the aramid staple fibers 22 in a glue line 18 between the glue line 18 and the lining layer 14, and it has connected both layers. A path is 5-20 micrometers, and the length of this aramid staple fiber 22 is 0.5-1mm. Moreover, as for the loadings, considering as 0.5 - 2.0vol% is desirable. When the loadings of the aramid staple fiber 22 exceed less than [0.5vol%] or 2.0vol(s)%, it is in the inclination whose improvement grade of the bond strength of the lining layer 14 decreases.

[0010] The friction material 10 shown in drawing 1 - drawing 2 can be manufactured according to the process shown in drawing 3 . First, dryness is given, after punching a breakthrough at a metal plate (a plate may only be called hereafter) and performing various kinds of surface treatment to this plate. A granular object is injected in this surface treatment towards the degreasing process and plate side which degrease a plate, and the shot processing process for raising the bond strength of a RA glue line and a plate is included in it. Subsequently, thermosetting adhesives, such as NBR with which the aramid staple fiber of the specified quantity was mixed, are applied on the surface of a plate, and it dries at a dryness process. In this case, thickness of the glue line at the time of an application is set to 0.6-0.8mm, and it is made for the thickness of the glue line at the time of dryness to be set to 0.2-0.4mm.

[0011] Fabrication of a lining layer is made apart from the processing process of such a plate. In fabrication of a lining layer, after mixing a raw material, specified quantity measurement is carried out, and it preforms and considers as a plate. As a raw material of this example, iron, copper, an aramid staple fiber, a graphite, an antimony oxide, a barium sulfate, and phenol resin are used. In addition, as phenol resin, the thermosetting adhesive which forms a glue line 18 (drawing 2) can be used. Thus, the plate by which preforming was carried out to the processed plate is made into one, and heating and pressing are performed. This heating and pressing can be performed by the method proposed in JP,2-292535,A. In this example, the friction material obtained by carrying out heating and pressing is calcinated for about 9 hours with the air-heating furnace currently held at about 180-230 degrees C. Then, the product of the post processing which gives polish which grinds the front face of the lining layer of the obtained friction material is performed and carried out.

[0012] Thus, the bond strength of the lining layer 14 of the friction material of the obtained this example was measured. The result was shown below. Furthermore, the bond strength of the lining layer of the friction material (comparison friction material) which adhesives were applied to the plate, without blending an aramid staple fiber into adhesives, and also was obtained like this example in the process shown in drawing 3 as comparison was measured. The result was written together below. In addition, measurement of the bond strength of the lining layer which constitutes friction material is JASO. It measured based on C437-84.

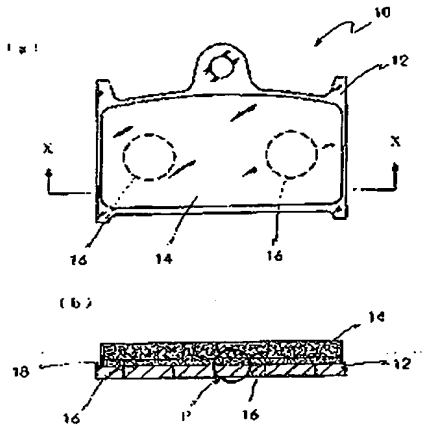
Friction material of the bond-strength this example of a lining layer 63 kg/cm2 Comparison friction material 45 kg/cm2 Even if it uses a flat plate for this appearance in the friction material of this example, the bond strength of a lining layer can be improved.

[0013] As mentioned above, in the described this example, although the aramid staple fiber was used as a staple fiber blended with a glue line 14, thermal resistance, such as rock wool, a carbon fiber, and a potassium titanate fiber, can use good fiber. in addition, these fiber comes out not to mention the ability to use it also as a staple fiber which constitutes a lining layer

[0014]

[Effect of the Invention] Since according to this invention the bond strength of the lining layer of non asbestos system friction material can be improved even if it uses a flat plate, the safety of vehicles can be improved and the productivity of the manufacturing process of friction material can also improve.

【図1】



【図2】